# Persuasive Technology for Learning in Business Context

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## Abstract

Persuasive Design is a relatively new concept which employs general principles of persuasion that can be implemented in persuasive technology. This concept has been introduced by BJ Fogg in 1998, who since then has further extended it to use computers for changing attitudes and behaviour. Such principles can be applied very well in learning and teaching: in traditional human-led learning, teachers always have employed persuasion as one of the elements of teaching. Persuasive technology moves these principles into the digital domain, by focusing on technology that inherently stimulates learners to learn more quickly and effectively. This is very relevant for the area of Business Management in several aspects: Consumer Behavior, Communications, Human Resource, Marketing & Advertising, Organisational Behavior & Leadership. The persuasive principles identified by BJ Fogg are: reduction, tunnelling, tailoring, suggestion, self-monitoring, surveillance, conditioning, simulation, social signals. Also relevant is the concept of KAIROS, which means the just-in-time, at the right place provision of information/stimulus. In the EuroPLOT project (2010-2013) we have developed persuasive learning objects and tools (PLOTs) in which we have applied persuasive designs and principles. In this context, we have developed a pedagogical framework for active engagement, based on persuasive design in

which the principles of persuasive learning have been formalised in a 6-step guide for persuasive learning. These principles have been embedded in two tools – PLOTmaker and PLOTLearner – which have been developed for creating persuasive learning objects. The tools provide specific capability for implementing persuasive principles at the very beginning of the design of learning objects. The feasibility of employing persuasive learning concepts with these tools has been investigated in four different case studies with groups of teachers and learners from realms with distinctly different teaching and learning practices: Business Computing, language learning, museum learning, and chemical substance handling. These case studies have involved the following learner target groups: school children, university students, tertiary students, vocational learners and adult learners. With regards to the learning context, they address archive-based learning, industrial training, and academic teaching. Alltogether, these case studies include participants from Sweden, Africa (Madagascar), Denmark, Czech Republic, and UK. One of the outcomes of this investigation was that one cannot apply a common set of persuasive designs that would be valid for general use in all situations: on the contrary, the persuasive principles are very specific to learning contexts and therefore must be specifically tailored for each situation. Two of these case studies have a direct relevance to education in the realm of Business Management: Business Computing and language learning (for International Business). In this paper we will present the first results from the evaluation of persuasive technology driven learning in these two relevant areas.

**Keywords:** Business education, emerging technology, persuasive design, technology enhanced learning.

## Introduction

Since the introduction of the concept of *Persuasive Technology* (PT) by BJ Fogg (2003), the underlying principles of this emerging technology have been applied in technical systems that intend to change human attitude and/or behaviours, for example in car driving behaviour (Meschtscherjakov, 2009). This concept is highly relevant for the business communities, as persuasive principles are present in the studies of Consumer Behavior, Communications, Human Resource, Marketing & Advertising, Organisational Behavior & Leadership. The application of this concept in Learning appears to be promising too and has already been successfully been applied in young people with Autistic Spectrum

Disorders (Mintz, 2012). In 2010, the EuroPLOT project began to address the development of persuasive technologies and objects (PLOTs) for a wide variety of learning contexts and has evaluated them in four distinct case studies. Among these, this project has addressed two topics which are very relevant to Business Management: Business Computing academic education, and language learning. The latter one is highly relevant for the Internationalisation of businesses, and persuasive learning can play a pivotal role in teaching and learning complex languages.

In this paper, we will present some basics of the new emerging persuasive technology which are relevant to Business Management. In particular, we will present first results from the evaluation of those case studies in the EuroPLOT project.

## Fundamentals of Persuasive Technology and Persuasive Design

*Persuasive Technology* (PT) was established as a field of active research in 1993 by BJ Fogg, who during his PhD thesis began to study computers as persuasive agents. He published his results first in a paper in 1998 (Fogg) and then wrote his seminal book about this new approach (Fogg, 2003). Essentially coming from a background in social psychology and HCI, he described how computers could be considered social actors, and how theories regarding social influence and persuasion could be considered in a digital perspective. His definition of PT is "interactive computer technology, designed with the intent to change people's attitudes or behaviour" (Fogg, 2003). It therefore is at the intersection of persuasion and interactive technology, as shown in Figure 1.

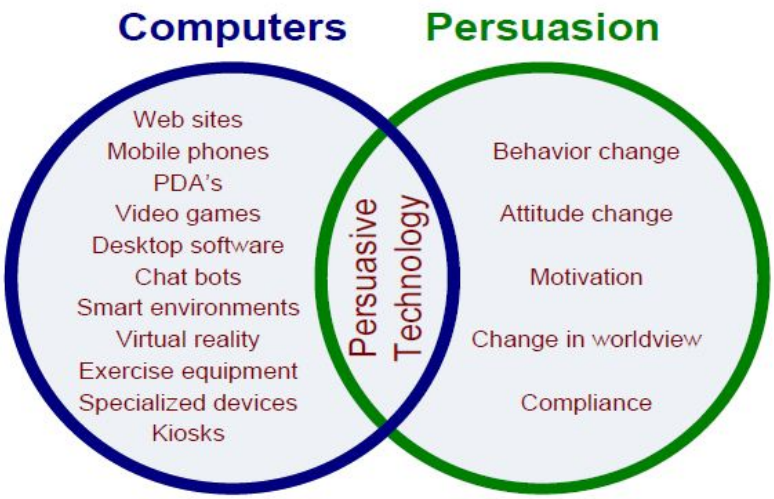


**Figure 1. Persuasive Technology at the intersection between persuasion and interactive computing technology (Fogg, 2003).**

By the term *persuasive*, Fogg proposes that computers hold a particularly strong potential to change the attitudes and behaviors of the users, but emphasises that the designer cannot rely on coercion or deception in influencing the user. Fogg defines a specific perspective on interactive computer technologies, which distinguishes itself from e.g. marketing technologies or technologies which somehow mislead the users. The so-called *functional triad* is one way of classifying the viewing or responding to computing technologies: as tools, media, or social actors (see Figure 2).

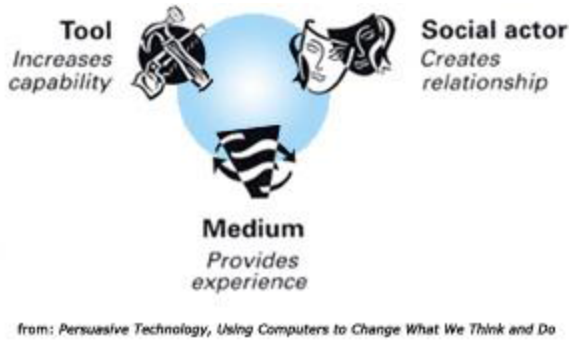


**Figure 2. The Functional Triad of Persuasion**

**Persuasive Design Principles**

In order to develop tools, several *persuasive design* (PD) principles have been defined, each of which covers a different aspect of persuasion. These become important when the PD principles are to be applied in tools for e-Learning.

**Reduction** refers to the design strategy of simplifying what would otherwise be a complex process. For example, Amazon's 1-click purchase which lets you skip a lot of time consuming navigations and tedious form filling, in order to make an instant purchase.

**Tunnelling** is a design strategy which places the user inside a process that has a pre-determined direction. E.g. most installation processes require that the user completes several steps before the installations process is completed.

**Tailoring** is the degree to which a site or a program presents relevant content to individual users or user groups. Navigational options, filtering mechanisms and labelling systems can all be adapted to reflect user demographics.

**Suggestion** is the persuasive design strategy of delivering a message at the opportune moment. E.g. when Amazon suggests extra books which are closely related to the one you were just about to buy.

**Self-monitoring** is the design strategy which allows you to monitor progress. E.g. sites which require a log-in and then enables the user to monitor the progress of weight loss.

**Surveillance** is closely related to self-monitoring; however the monitoring is not done by the user but by the system or the owners of the system. E.g. when using a weight loss website, users may be motivated not only by monitoring their own progress, but also by sharing experience and receiving feedback from other users who are struggling with similar issues. By sharing statistics, diet-plans etc. users feel more related to each other and may be inspired by actions taken by others.

**Conditioning** refers to the strategy of embedding emotional feedback into a design. It is often expressed as praise and rewards, but in a slightly more subtle manner than be the case with Persuasive Social Actors. E.g. when forums reward users with increasingly lofty titles (or user rights) in correlation to the number of posts made by the user.

**Kairos** stems from ideas of Greek philosophers, in particular Aristotle. It may be defined as the *opportune moment* to perform a persuasive action. It is a quite powerful concept which is not easily formalised, but its use in technology applications can significantly contribute to persuasiveness by the just-in-time and just-in-place paradigms.

## Persuasive Learning in the EuroPLOT Project

The EuroPLOT (2010) project was initiated to investigate the benefits of such persuasive technology for the purpose of improving technology-enhanced teaching and learning and using persuasive elements and designs in order to increase the learning success. In this project, that is funded by the Education, Audiovisual and Culture Executive Agency (EACEA) of the European Commission in the Lifelong Learning Programme from 2010-2013, we have developed a framework for developing persuasive learning designs (Gram-Hansen, 2012). This framework was used to inform the development of two tools which allow the creation of persuasive learning objects based on persuasive learning designs: PLOTmaker and PLOTLearner. These two tools have been develop from existing tools which have been extended with the persuasive elements and design options. These tools and the learning objects created with them have been applied and evaluated in four different case studies with groups of teachers and learners from realms with distinctly different teaching and learning practices: Academic business computing, language learning, museum learning, and chemical substance handling. Alltogether, these case studies have involved the following wide range of learner target groups: school children, university students, tertiary students, vocational learners and adult learners. With regards to the learning context, they address archive-based learning, industrial training, and academic teaching. The participants in these case studies are from Sweden, Africa (Madagascar), Denmark, Czech Republic, and UK.

When working towards designing the integration of persuasive designs into the tools for creating learning objects and the case studies, we realised that a simple one-fits-all approach was not feasible. The application of persuasive design elements is very context sensitive, and therefore is different for each scenario or case study. Therefore, the four case studies did employ different persuasive designs, and the application of the two tools for creating persuasive learning objects was specific to the case study scenario.

## Tools for Creating Persuasive Learning Objects

The EuroPLOT project developed two tools which embed persuasive principles for creating persuasive learning objects. These tools did evolve from previous software that already was established for creating learning objects.

### PLOTMaker

The tool *PLOTMaker* is based on the software tool *GLOmaker*, which has been developed by London Metroplitan University and is freely available for download (GLOmaker, 2013) using an open source license. It is a WYSIWYG authoring tool and works on several platforms (PC, tablet, mobile phones). During 2012, GLOmaker has been downloaded 5,024 times, and the web site had 18,198 visitors from 129 different countries. The project Europlot funded the development of PLOTMaker, which extended GLOmaker on the basis that the persuasiveness of a learning design is not dependent on the technology itself, but on how the technology is applied within a given context: it enables teachers, trainers and students to dynamically manipulate elements of the learning context. This is achieved by exploring the generation of 'meaning' in the physical environment and the inherent relationship between learning content and the context of that content. Furthermore, it allows to rapidly create pedagogically based mobile learning apps in an intuitive and easy way.

The biggest strength of this authoring tool is the inclusion of the Augmented Reality paradigm, which allows to overlay information just-in-space. This realises the KAIROS persuasive principle and allows

to tailor learning around an immersive experience linked to the real world. The feasibility of this approach has been demonstrated in the EuroPLOT case study *Kaj Munk Museum* where a real museum site is "augmented" with information that the learner can access through a mobile device. In the EuroPLOT project, PLOTmaker is further used to create learning objects for learning in industrial context (learning of chemical handling) and in academic learning of business computing. The latter case study will be described further in this paper.

**PLOTLearner**

PLOTLearner was been developed based on the 3ET (Ezer's Emdros Based Exercise Tool) software from 2010, but the PLOT theory has changed the development of a new kind of corpus-driven language learning considerably (PLOTLearner, 2012). Its main characteristic is that it uses a large corpus of data in which language texts are stored. The underlying database EMDROS (2013) has been developed to allow storing and retrieving annotated text, which can be stored and broken into components such as words, phrases, clauses, and sentences. It also allows to break down the text structure as collection, volume, book, chapter, segment, quote, or any other element of a corpus. The unique capabilities of this tool have been utilised in applications where a large corpus of text is available, for example in the study of ancient languages (Greek, Hebrew) and writers' archives (e.g. Kaj Munk museum and archive).

The use of such a database allows a new kind of learning by the system PLOTLearner showing the structure of a text and letting the learner engage with the text in corpus-driven self-study. In the EuroPLOT project, this approach and the tool PLOTLearner has been used in two case studies: language learning, and museum archival learning.

The PLOTLearner workpackage of EuroPLOT is designing and reviewing interactive learning technology with some of these persuasive functions for enhanced effectiveness and efficiency. The new learning technology PLOTLearner aims to persuade learners to understand and practice simple learning skills like writing, reading, and parsing of morphology and syntax. It is downloaded on the

PC from the internet (http://eplot.3bmoodle.dk/index.php/downloads). EuroPLOT has developed 12 introductory sessions that guide the learner into the interface through the learning of basic grammatical features from the text of Genesis 1:1-5 with guest login for a Moodle site (http://bh.3bmoodle.dk/course/view.php?id=2).

**The Four EuroPLOT Case Studies**

In the EuroPLOT project, we are investigating the effectiveness of learning/teaching with persuasive technology through a set of four case studies. Alltogether, these case studies cover several different learning styles, learner and teacher groups, countries and cultures. As target learners they address school children, university students, tertiary students, vocational learners and adult learners. With regards to the learning context, they address archive-based learning, industrial training, and academic teaching. Internationally these case studies include participants from Sweden, Africa (Madagascar), Denmark, Czech Republic, and UK. These case studies do not claim to give a comprehensive answer to the question if persuasive learning does have a deeper positive impact than traditional learning. However, they allow to exemplary show that this approach does have benefits.

**Academic Business Computing.** This case study is undertaken in the framework of database teaching in an academic computer course which are taught at two universities. The learning objects in this course are developed with the tool PLOTmaker and are focussing on teaching basic SQL. The goal of this case study is to demonstrate the applicability of this approach in two different countries and languages (UK, English, and Czech Republic, Czech).

**Language Learning.** This case study investigated the learning of language with the help of a large corpus of text. The learning tool PLOTLearner was specifically developed for this kind of learning with a large text repository (data-driven learning) from annotated texts. In EuroPLOT, PLOTLearner is used to teach Ancient Hebrew. Due to the difficulty of this language, this provides a valuable example of showing how a language with a different visual writing system can be taught effectively to students through the engagement with a large structured text corpus.

**Kaj Munk Museum.** The Danish writer Kaj Munk has produced a significant oeuvre of plays and letters, all of which is archived in the Kaj Munk Archive and Museum in Sikleborg (Denmark). Learners who want to inform themselves about life and work of this writer can do so through several methods which are being developed in this EuroPLOT project: they can explore the writings through a tool that allows structured access through the EMDROS database of Kaj Munk's works. This partially includes the PLOTlearner approach for engaging with large text corpus information. Furthermore, at the location of the Kaj Munk Museum, an Augmented Reality learning object was developed with PLOTmaker, showing relevant information at specific locations in the true spatial context.

**Chemical Substance Handling.** In an industrial context, employees often need refresher training of certain safety procedures. This is especially important in the case of using chemical substances. In the EuroPLOT project, the Danish Hydraulics Institute (DHI) has used PLOTmaker to develop learning objects which teach adult learners in an industrial context how to handle chemicals. This considers health and safety aspects, and the persuasion of the learning objects is implemented through simulation.

## Evaluation of Persuasive Learning

In this paper we will closer look at two of those four case studies which we identified to be of relevance for the Business Management community. Lifelong learning is in todays business world a highly important factor, and the internationalisation of general business conduct requires cross-cultural competencies. Therefore, the following two case studies shall be looked at deeper: Academic Business Computing, in which the same tools have been applied in two different countries (UK and Czech Republic) with different teaching traditions and language, and Language Learning, in which Ancient Hebrew is taught to students in Madagascar. The latter case study makes a very good case for using the persuasive tools for internationalisation and cross-cultural engagement.

### Academic Business Computing

Two partners in the EuroPLOT project, Leeds Metropolitan University (LMU) and University of Hradec Králové (UHK), led the case study of creation, evaluation and sharing of digital learning objects

in teaching database systems for business computing students. At both universities, an outcome-based learning design paradigm was used for creating the courses and both universities use virtual learning environment *Blackboard Learn*. The main concern therefore is, whether the persuasive design principles can enhance the learning experience of students in this environment.

Teaching of databases is integral to all Computer Science and Information Technology-related courses. Graduates should be able to solve problems, which require a combination of knowledge of principles as well as the ability to recognize when a particular problem could benefit from a specific principle. Moreover, they should have practical skills. The students should be trained for understanding to be able perform far-transfer tasks (Clark, 2008), for which there are no identical elements because the context of performance changes each time. Some proven methods include:

- Use varied context examples and practice.
- Engage learners in comparisons of varied context worked examples.
- Incorporate the whys and hows into worked examples.

Knight's longitudinal study (2010) which evaluates the different learning strategies adopted by students when accessing virtual learning environment (VLE)-hosted resources, reveals students who adopted a deep learning approach, in which online resources were accessed consistently throughout the module, performed markedly higher than surface learners who focused their online activity at the beginning or end of the module's duration.

The Teaching, Learning and Assessment in Databases (TLAD) which is an annual event that brings together database teachers and researchers in all academic institutions globally to share good learning, teaching and assessment practice, acknowledge that teaching concepts such as normalisation and SQL are problematic. Therefore it was decided to develop persuasive learning objects supporting the understanding of normalisation at LMU and PLOTs supporting the understanding of basic SQL to develop at UHK At UHK, data of 132 students were analysed who were registered in the Database course at the UHK in the previous academic year. Specially, it was analysed how many students have undertaken home tests available in each of 10 modules from which the course is composed. The tests

are not compulsory, but each successfully answered test is awarded by 1 point and contributes to the final grade (10 points out of 100 points totally). The number of students taking these tests decline towards the end of semester. It was decided to try to change the students' behaviour via applying persuasive design principles. The intended change of students' behaviour can be classified according to the Fogg's behavior wizard as BlueSpan – we want students to do the familiar behaviour for a period of time. According to the wizard, designing span behaviours requires special consideration; a span intervention might pay close attention to the strategic use of regular triggers which have to be activated when the person has sufficient motivation and ability to perform the behaviour. VLA has several possibilities as announcements, notifications or messages which can be used to announce the users that new test is available. As VLA keeps a lot of data about the learner's activities, triggers can be issued in the best time - in the time slots, when most students are on-line and work with study materials.
To increase the ability of students, a stand-alone persuasive learning objects can be involved. The main goal of these objects is to give students a chance to review quickly the topic, before starting the test. The main persuasive principle used in the PLOT's design is **reduction** and **interactivity**.

The Blackboard VLE affords also natural flow of discussions as threads that are necessary in depicting interaction and presence. These elements are alluded to by students as important aspects of online course design, especially in instilling a sense of community. PLOTs can be deployed supplemented by fruitful discussions as follows:

- Working through the persuasive learning objects, fed forward to the
- asynchronous collaborative discussions enabling shared discussion of tasks, and finally
- attempting the assessment, in the form of multiple-choice questions (MCQs).

At LeedsMet, a focus group took part in the evaluation of the task "normalisation of a database". Students commented positively about the following aspects of this learning approach: videos that were used allowed a better understanding of complex normalisation concepts. The content was structured to be gradually absorbed by learner. Different forms of presentation persuaded learner engagement with the media in terms of capturing and focusing attention. The audio narrative clarified and simplified understanding of concepts (catering for visual and auditory learners), and the voice humanised the LO

(especially for online learning) and persuaded learners to engage with the content. The audio also strengthened trustworthiness and credibility which portray a good teaching presence. Self-assessment within a LO was fostered through quizzes. The LO engaged and motivated students to interact with it repetitively as it was integrated with the F2F teaching (blended approach). The face-to-face (F2F) teaching is blended with the online activities, by combining with multiple-choice question assessments in the VLE to further assess if learning has taken place. The videos condensed F2F teaching and allowed for more inclusive learning – both for online learning and during F2F lab sessions. Filtering key information into concise chunks can provide more targeted learning content that encourages learners to take on a deeper approach to learning, increasing the quality of cognitive presence. This goes further in humanising support and catering to the different learning styles that are shaped by cultural influences (cultural inclusivity). Both practical understanding and theoretical underpinnings of the concepts were clarified by the LO, and these points were able to be assessed adequately through the quiz questions within the LO as well as the MCQs included in the VLE, therefore fulfilling the learning outcomes. Students' feedback was that the LO was easy to navigate and usable; nothing remained complex or unclear, the LO very structured in a scaffolded approach. Additional help was not required to access or use the LO – the LO allows for self-directed learning. Problems occurred in accessing the learning object from the VLE – students needed to download the Flash plug-in. When asked for suggestions for improvements, students replied that the activity in the video could be more interactive – allowing students to be able to complete exercises that will drag and drop attributes to build normalised tables interactively. Furthermore, it would be desirable if feedback for the incorrect choices made under the quiz section provided clues/tips that would help choose correct answers (not compulsory).

**Language Learning**

The learning of complex languages has been investigated through the case study of learning and teaching Ancient Hebrew. The learner communities were not only from Denmark, but also from Sweden and Madagascar. The task is to design a corpus application for persuasive corpus-driven language learning that can function as a tool for training as well as a medium for simulation, and will embody social actor aspects. We assume that tool functions do not persuade learners on a cline from the weakest routines

in **reduction** all the way down to strongest Pavlovian stimulus-response mechanism in **conditioning** because learning is not a simple matter of behaviouristic reward. For a learning persuader system, we will propose a hierarchical architecture with suggestion at its core and two branches of increasingly stronger persuasive influence on ability and motivation as illustrated in Figure 1. As learners are autonomous creatures who want self-determination and strive for mastery, the maximally persuasive system will invite the ideal learner to choose at will from a pool with **suggestion**, but it will also offer to gently guide the learner into knowledge and practice by stimulating activity and interest.

From the perspective of the functional triad, PLOTLearner is a tool to simplify the practice involved in the acquisition of morphology, phrase structure, syntax, as well as most other basic language 11 Corpus as Tutor skills. Yet it is also a simulation of the study of the Hebrew Bible in the original languages and as such it is a persuasive tutoring system. It serves as a translation informant who checks the glosses and helps learners memorize vocabulary through frequency ranking displayed for each word within the text. As a reading helper, it checks the learner's writing, reading, and spelling skills. Moreover, it also opens a textual world visualizing the hierarchical layers of the text to enable exercises in interpretation as well as discourse-pragmatic analysis. Through interlinear display and pop-up information, the learner can discover the linguistic world of the text and select the most desirable tasks. Pronunciation is not presently supported by sound files, but a transliteration of the Hebrew characters according to contemporary Israeli standards helps learners master the reading symbols shewa and dagesh very quickly. Typing of text helps learners to master a foreign script and scrutinize the exact visual shape of the text. In this way, PLOTLearner supports the three most important tasks of language learning. The learner can engage interactively with the corpus to observe and memorize the structure and functions of the form. The text supervises the practicing of skills for reading, writing, parsing, and syntactic analysis of forms. The learner plots his progress through statistics data and a graphical display of his learning journey, which is projected onto an image with the view from the top of Mount Sinai (in which vicinity the world's first alphabet has been found, dating back to the time of Moses).

Considerable quantitative and qualitative data from learner testing helps EuroPLOT to improve on persuasive efficiency. We are of course aware that we cannot control persuasive learning, but we can at least exploit feedback to improve the design of the teaching in a feedback loop between design and outcome in order to discover which techniques work best (Laurillard 2012, 5). Only scaling to much larger populations of learners will we ultimately be able to indicate how revolutionary this particular kind of persuasive corpus-driven learning really is.

## Conclusion

The concept of persuasive technology offers a lot of potential benefits for the application in various business contexts, such as Consumer Behavior, Communications, Human Resource, Marketing & Advertising, Organisational Behavior & Leadership. We have shown that this technology works well for encouraging learning, both formal and informal, demonstrated in four case studies that are covering a wide variety of learning styles and contexts. Further work needs to be done in quantitatively evaluating and comparing persuasive learning with traditional learning approaches.

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